The commissioning run in June/Aug was a big success.
Everyone worked very hard and a lot of good results were achieved.
We demonstrated that the machines can work.

Primary achievements:

1. Cooled both rings
2. Powered all dipoles, quads, steering dipoles (They were all superconducting.)
3. PASS worked.
4. Circulated beam in both rings.
5. Ramped magnets in both rings.
6. Captured beam.
7. Accelerated beam.
8. Measured orbits.
9. Measured losses.
10. Measured tunes with beam and tune kickers.
11. Measured turn-by-turn transverse profile of beam!
12. Measured longitudinal profiles with wall current monitors.
13. Measured beam current with DCCT.
14. Schottky cavity worked.
15. Extracted beam with the abort kickers in Blue ring.

We actually had all the systems working!

Main Goals for Future

- Provide colliding beams to experiments.
- Move from mode where commissioners and specialists are on shift to a mode where Operations and CAS run and maintain the machines.
- Improve operation to have a high percentage of up time (i. e., actual collisions).
- Increase the luminosity to the design level or beyond with low backgrounds. (to 10% of design level at end of next run.)

Still need to work on:

- Stability
- Reliability
- Reproducibility
- Availability

- Comfort displays
- Logging and analysis -- need to gather statistics on down time and failures
- Data correlation
- Archiving: save/restore
- Model (on-line and off-line)
- Data between accelerator and experiments (CDEV)
- Firewall -- steering committee (Katz, Satogata, Gould, MacKay)

- Install collimators
- Fire up rest of rf cavities
- Ramp magnets at design rate
- Ramp to full field
- Choreographing the magnet ramps together
- Get yellow abort kickers working
- Receive and install bipolar supplies -- when?
  Can we live without some of them?
- Build and install γ_t supplies -- when?
  Can we live without the jump for now?

Fixes and improvements:

- Consolidate some applications to use console screens more effectively (e.g., Add a loss monitor bar to the orbit display.)
- Load correct calibration constants for PS MADC's.
- Develop better PS GUI's than pet pages.
- When a power supply or WFG goes south, the GUI should flag it somehow, if it is currently being displayed.
- Eradicate false readouts.
- Improve organization of pet pages.
- Problem of ADO's hanging up on managers, etc.
- Get BPM's at IR's working for both beams.
- Cool alcoves
- Bellows repairs (how many and when?)
- Increase resolution of sextupole supplies -- how much?

Quality control issues, e. g.:

- Miswired power supplies.
- Miswired warm-up heaters.
- Incorrect database entries (BPM's with bad aliases, MADC's with wrong constants.)

Use operators

- QA checkouts of the systems. We can assign an operator to each system to check out each element.
- Work with the system commissioner/specialists to develop some web based documentation for quick help references and recipes from the users standpoint instead of the application writers standpoint.
- Work with system specialists to develop diagnostics.

Example Systems:

- RF (storage, acceleration)
- Damper systems (transverse and longitudinal)
- Power supplies/magnets/quench
- Orbit/BPM's (more modes?)
- BLM's
- IPM's
- Flags
- Schottky cavities
- Current transformers
- Wall current monitors
- Vacuum
- Cryogenics
- Alarm system
- Abort kickers
- Permit link
- Injection kickers
- Timing links
- RTDL link
- ZDC
- PASS (already has several operators working on it)
- Collimators
- γ_t-jump
- ac dipoles

Standard measurements which ought to become routine:

- Orbit
- Tune measurement
- Chromaticity measurement
- Beta functions
- Profiles and emittances
- Relative luminosity
- γ_t phase jump
- Bunch currents
- DC currents

Other measurements:

- Hysteresis effects from D0 and DX trim currents.
  effect on orbit
- Hysteresis effects from persistent currents (time dependent) as well as from the iron (time independent).
  effect on orbit and tunes
- Aperture scans for obstructions.
- Injection fluctuations (stability of pulsed elements in AGS and RHIC).

Start-up Schedule

1. Cool down (blue ring first)
2. Power supply testing dedicated (~2-3 weeks?)
   - Blue ring tests start while yellow ring cools
   - Beam in ATR (~1 shift per day) to tune up
     - Use a dedicated team for tuning up the ATR rather than Rotating through all shifts during dedicated PS tests.
3. Alternate shifts of
   - Dedicated PS testing (as needed)
   - Beam commissioning
     - Note: Accesses could be made at the end of the beam shift so that the ring could be reswept during the PS shift.
4. Alternate shifts of
   - Dedicated beam studies
   - Dedicated collisions for experiments
     - First (3x3) at injection, later accelerated beam
   - Dedicated PS testing (as needed)
5. Like 4 but with longer periods of collisions.

MCR Shift teams:

- Beam studies:
  - Two "physicists"
  - Two operators
  - Other system specialists as needed
- Dedicated collisions for experiments:
  - Two operators
  - *n* physicists, where initially *n*=2, then 1, then 0 as we gain experience.

By involving operators in the commissioning, we will be training the operators more quickly and will gain reliability since operators are typically better at following procedures. System specialists may be freed up to commission their systems while the main MCR crew is running.

Shift schedule -- to be determined

- Operators will keep to their shift rotation
- Physicist shifts: (12hr ?)

Need to have CAS more involved in maintenance of new systems.

Other Questions

Quench system

- What do we do down the road when the power supply group does not man 1004B round the clock?

Luminosity

- Estimate from beam parameters.
- Measure with ZDC.
- Compare with experiments. (This gets into a long-term program.)

Safety issues -- (Discuss in a different forum)

PASS issues -- upgrades and testing

Operational safety limits -- (should be a smaller group)

How do we get to next level and what is it?

Parallel Session on Operations:

Injectors: Postmortem	L. Ahrens
Operations Integration	P. Ingrassia
Operations Analysis	T. Satogata
General Impressions	M. Harrison
Controls Integration	J. Morris

Room 302

Goals:

- Get to mode where operators run machine
- Collisions on demand
  Learn tune up for good luminosity.
- Luminosity: 10% of design by end of run
- Availability: 70-80% up time by end of run
- Reliability: ≤ 1 failure/month/system

- Obtain, install, and commission missing/unused systems, e.g.,
  - Power supplies: bipolar, γ_t-jump, snake
  - Collimators
  - Snakes
  - IPM magnets
  - More rf -- particularly 200 MHz systems
  - ZDC's
  - Yellow abort
  - Permit links

Schedule:

Shutdown -- Major Problems:

- Delivery of bipolar supplies: When? What can we live without?
- Aperture -- Bellows repairs: How many and when?
- Design and construction of γ_t-jump power supplies:
  When? Can we live without them for the next year?

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Injector issues:

- Intensity is barely adequate to meet design
- Booster injection is ~50%
- Only 5 of 6 bunches are transferred
  Change PFN to increase pulse length by 100ns
- Transverse sizes not well understood -- need to improve measurements and model.
- Longitudinal emittance
- AGS extraction bumps interact with Main magnet field.
- ATR magnet readbacks; is there noise as well?
- ATR flags: position reproducibility and location of center;
  orientation?
- Booster noise (effect on stored lifetime and emittance).

- Reestablish Permit links.
- Reestablish mode for Wdump extraction with beam in RHIC.
- ATR needs a more careful and systematic study.
  - Discrepancies with model
  - Sloppy orbit
  - Beam jitter

- Can we raise operational safety limits: how and when?
  (both for ATR & RHIC)

Operations issues:

- Define a role for operators:
  - Commissioning
    Physicist: Determines strategy
    Operator: Implements strategy
  - Normal operations
    Coordinator: Determines strategy
    Operator: Implements strategy

- Identify systems lacking engineered protection.
- Operations need hands on experience.
- Need to use trouble reports for RHIC systems.
- Develop better documentation (emphasize operations).
- Fidelity of Configuration, Databases, Ramps, etc.
  - Use operators to help checkout systems.

Operations Analysis

- Better model support: online and offline
- Experiment ↔ Machine coordination
- Finish commissioning orbit system
  Orbits, correction, tune, chromaticity, coupling, luminosity tuning ...
- Coordinate Physics Applications
- Develop the sequencer

Other Controls Issues

- Need better ATR power supply GUI.
- Missing hardware, e.g.,
  FEC to drive Reset link should be on UPS.
- Eliminate false information.
- Need more standardization of Applications and Pet pages.
- Consolidation of displays.
- Postmortem support.
- Better organization of alarms.
- Streamline procedure for database updates of configuration.